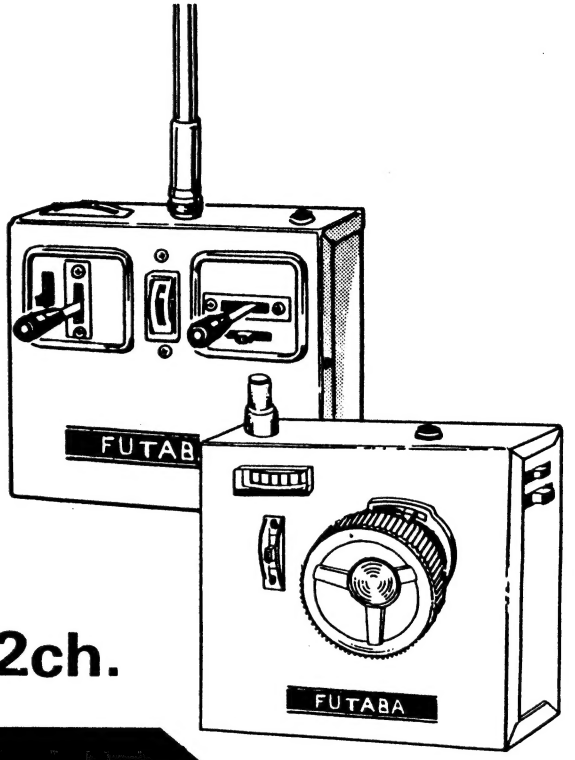
Futaba®

DIGITAL PROPORTIONAL RADIO CONTROL



FP - 2E 2ch. FP - 2F 2ch.

FUTABA CORPORATION OF AMERICA
FUTABA CORPORATION

D60022

INDEX

Features ..... ❶

Composition and Specifications ..... ❷

Transmitter handling instructions ..... ❹

Receiver and servo handling instructions ..... ❾

Power supply, batteries, and voltage check ..... ⓫

Performance test and mounting precautions ..... ⓬

FUTABA proportional frequencies ..... ⓯

Factory repair service ..... ⓰

Guarantee ..... ⓱

FEATURES OF THE NEW FUTABA PROPORTIONAL RADIO CONTROL SYSTEM

TRANSMITTER (FP-T2E, FP-T2F)

1. Since all Futaba Proportional Models are designed and manufactured to identical standards, their maximum performance is displayed even when used with other receivers and servos.
2. The FP-T2E is a monostick 2-lever transmitter designed for use with gliders and various other models. Moreover, a ratchet, self-neutral or self-slow engine control system can be selected by means of the accessory spring, etc.
3. The newly developed stick (handle type, engine control lever) of the FP-T2F makes it still easier to use. This proportional system is ideal for automobiles, boats, etc.

RECEIVER, FP-R2GS, FP-R4H

1. The use of IC makes the unit compact, lightweight, and rugged (R2GS)
2. Resistance against spurious has been increased through the use of a double-tuned RF preselector circuit and shielded RF coil and OSC coil. (R2GS)
3. Operates normally even near transmitting and receiving antennas. (R2GS)
4. Small, lightweight, and rugged high-performance 4-channel AM receiver miniaturized by careful use of space between components on the PC board. (R4H)
5. Narrowband ceramic filter design for greater resistance against adjacent channel noise. (R4H)
6. Pulse noise rejection circuit increases noise resistance. (R4H)
7. New CMOS miniature IC decoder increases reliability. (R4H)
8. New type miniature high reliability crystal socket pins increase reliability and allow replacement of the crystal from the outside of the receiver. (R2GS, R4H)
9. Thick film gold plated 3P mini connector is compatible with existing Futaba RC sets (except the J.M. and SG Series). (R2GS, R4H)

SERVO FP-S28, FP-S29, FP-S32

1. Since the FP-S28, FP-S29, FP-S32 are designed and manufactured to the same standards, maximum performance is displayed when set in any Futaba Proportional transmitter and receiver.
2. Three-wire, compact, lightweight, rugged, high-output torque servoamps have been realized through the use of Futaba BA-6687 and BA-6686 custom monolithic IC.
3. The BA-6687 monolithic IC is a 12-pin sinlge-end-line IC containing 73 transistors, 13 diodes, and 79 resistors (total of 165 components). Its low current drain, high resolution, temperature compensation and built-in voltage regulator assure stable operation over the 4V~6.6V power supply voltage range without any mutual interference between servos.
4. The BA-6686 monolithic IC is a 9-pin sinlge-end-line IC incorporating 2 high output current (500mA) PNP transistors, 2 NPN transistors, 4 diodes and 4 resistors for a total of 12 components on a single chip.
5. High output torque: FP-S28, FP-S29 (3.5kg cm), FP-S32 (2.4kg cm)
6. Small, lightweight: FP-S28; 53g. FP-S29; 60g. FP-S32; 32g.
7. The potentiometer drive section of the FP-S28 is separately driven through a one-stage gear. The life of the element is almost permanent.
8. FP-S29 is a low cost servo and powerful torque of 3.5kg · cm or greater permits use not only in large buggies, but also in Class 60 boats, etc.
9. High operating speed of 0.16 sec/60° makes it perfect when especially high speed is necessary. (S32)

COMPOSITION AND SPECIFICATIONS

- **COMPOSITION:**

	Transmitter, Receiver: Dry cell battery	
Model	FP-2E	FP-2F
Number of channels	2-CH.	2-CH.
Transmitter	FP-T2E	FP-T2F
Receiver	FP-R4H, FP-R2GS	FP-R4H, FP-R2GS
Servo	FP-S32 FP-S28 FP-S29	FP-S32 FP-S28 FP-S29

• SPECIFICATIONS: (All specifications are subject to change without prior notice.)

TRANSMITTER (FP-T2E, FP-T2F)

Operating system	2-stick system (mono-stick) FP-T2E Handle type stick FP-T2F
Operating frequencies	27MHz band, 72MHz band
Antenna output	500mW
Modulation system	AM (amplitude modulation) Type of emission: A3 Pulse position modulation: 1310μS neutral (Pulse spacing at control neutral)
Power requirement	10.5V UM-3 or "AA" x 7 Dry Cell Battery 12.0V UM-3 or "AA" x 8 Dry Cell Battery (*T2E, 72MHz band only)
Current drain	140mA

RECEIVER, (FP-R2GS), (FP-R4H)

Receiving frequencies	27MHz band, 72MHz band
IF amplifier frequency	455kHz
Selectivity	3kHz/−3dB
Range	500m on the ground, 1000m in the air
Power requirement	4.8V~6.0V UM-3 "AA" x4 Dry Cell Battery
Current drain	6V 25mA
Dimensions	37 x 53.5 x 19mm (R2GS), 32 x 52 x 19.4mm (R4H)
Weight	38g. (R2GS), 30g. (R4H)

SERVO (FP-S28, FP-S29), (FP-S32)

Control system	3-wire, +pulse width control 650μS~1900μS
Operating angle	Rotary system one side 45° min (including trim)
Power requirement	6.0V UM-3 or "AA" x 4 Dry Cell Battery (used in conjection with receiver)
Current drain	6.0V 8mA (when stopped)
Output torque	FP-S28; FP-S29 3.5kg. cm, FP-S32 2.4kg.cm
Dimensions	FP-S28; 40.5 x 20 x 40.5mm, FP-S32 37 x 18 x 30.5mm FP-S29; 45.5 x 23 x 43.5mm
Weight	FP-S28; 53g, FP-S29; 60g, FP-S32; 32g
Speed	FP-S28; 0.24 sec/60° FP-S29; 0.25 sec/60° FP-S32; 0.16 sec/60°

TRANSMITTER HANDLING INSTRUCTIONS

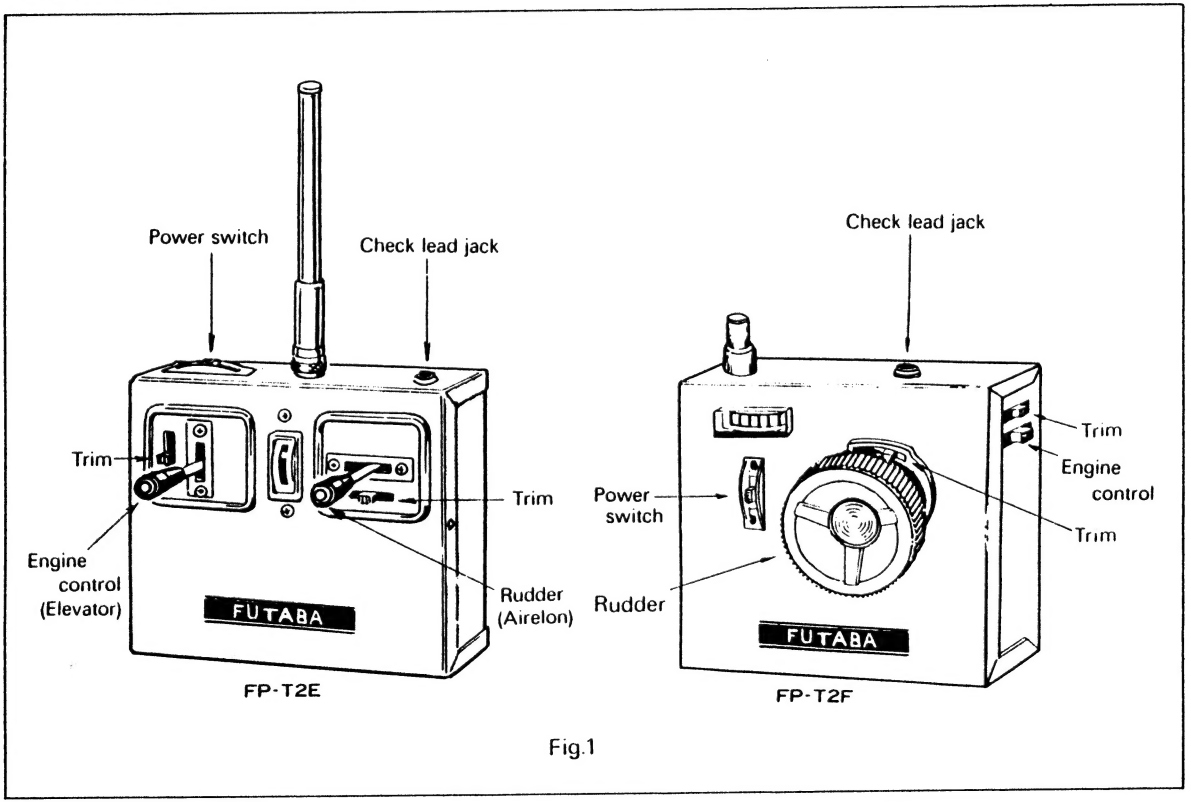


Fig.1

The controls on the front panel of the transmitter are shown in Fig.2. The manipulation of these controls should be thoroughly mastered.

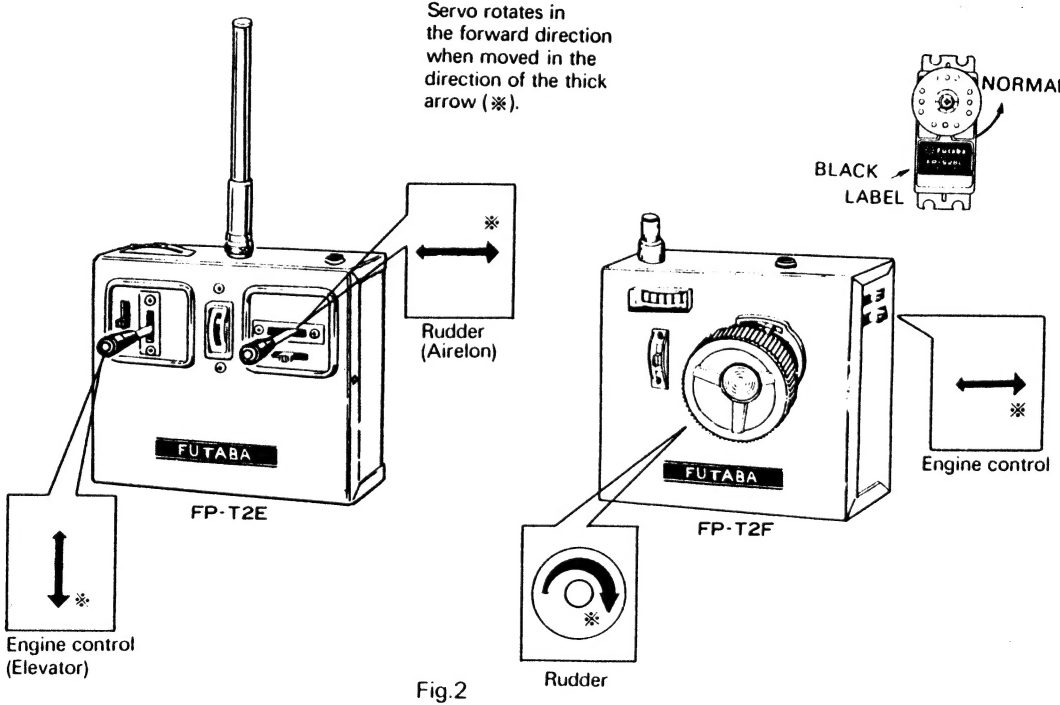
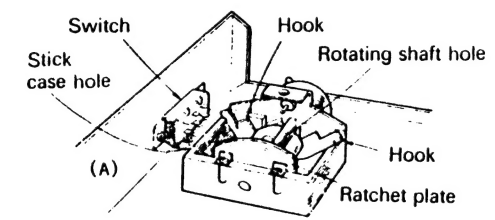


Fig.2

1. **FP-T2E**: Engine control or elevator operation can be performed with the lefthand (vertical direction) stick and the rudder and aileron operations can be performed with the righthand (horizontal direction) stick. The 3 methods of use shown in the below figure are possible with the accessory stick.

- **Can be used in 3 way with the spring as illustrated below.**



Remove the ratchet plate and install the switch

Fig.3

1) **Engine control ratchet system**
The engine control ratcher system is employed as standard.
The engine control lever can be set to at the desired engine speed.

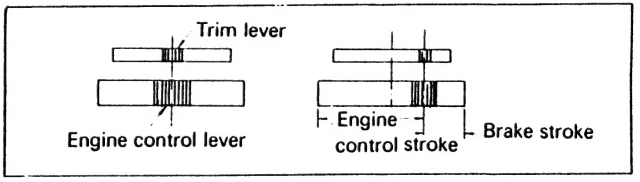
2) **Engine control self-neutral system**
Remove the ratchet plate and replace the weak spring with the strong spring supplied as an accessory.
The control system is then changed to the spring system in which the control position of the engine control lever becomes neutral. This can be used as the elevator lever in gliders, etc.

3) **Engine control self-slow system**
Remove the ratchet plate and install the strong spring supplied as accessory as shown in the figure. The engine control lever is then forcefully pulled to the rear by this spring. Engine speed is maximum slow when your finger is removed from the lever and can be adjusted to engine high by shifting the engine control lever.

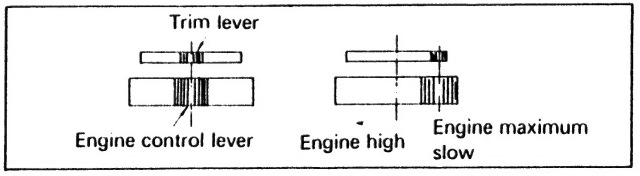
2. **FP-T2F:** The rudder operation can be performed by means of the handle (handle tilt angle is 47.5° to one side or 95° overall) and the throttle operation can be performed with the lever at the case.

The engine control system employs the self-neutral system as standard.

1) **Engine control self-neutral system**
The neutral position can be changed by shifting the trim lever. For example, when the engine control and brake operations are performed with the engine control level, the necessary stroke required by the brake can be freely set with the trim lever. Since the engine control lever is moved by the same amount when the trim lever is moved, the braking operation is extremely easy.



2) **Engine control self-slow system**
The engine can be operated at maximum slow by pushing the engine control trim lever back fully while your finger is off the engine control lever. The engine is run at high speed by operating the engine lever.



3) **Engine control ratchet system**
To set at the desired engine speed, operate the engine control trim lever without operating the engine control lever.

3. There is a 7P battery holder inside the transmitter. Load the new penlight batteries into this holder, paying careful attention to the (+) (−) polarity. Wrap rubber bands around the holder so that the batteries can not fly out. Since the power supply has been designed to use a Ni-Cd battery, the optional Ni-Cd set can be used directly. (*There is a 8P battery holder inside the transmitter; FP-T2E, 72MHz only).

4. When the antenna is securely installed and the switch is set to (ON), the pointer of the meter will deflect to within the green zone. At this time, the radio waves are already being radiated. When the meter pointer doesn't deflect, check for poor contact at the batteries.

5. If the meter pointer deflects to within the red zone, the range of the radio waves will become shorter.

6. Use the trim lever of each stick to fine adjust each part. Use these levers for neutral adjustment of the rudder and the flying posture after mounting in the aircraft.

7. Select either the long or short left and right stick knob, whichever is the easiest to use. The knob can be replaced by merely pulling off the black knob. (FP-T2E)

RECEIVER AND SERVO HANDLING INSTRUCTIONS

1. The 2-CH (FP-2E, FP-2F) receiver FP-R4H (FP-R2GS) incorporates a mini-block connector as an integral part of the receiver. The connection position of each part is shown in the figure. Make certain that the connections to each servo are correct. Use the black relay connector for the ailerons.

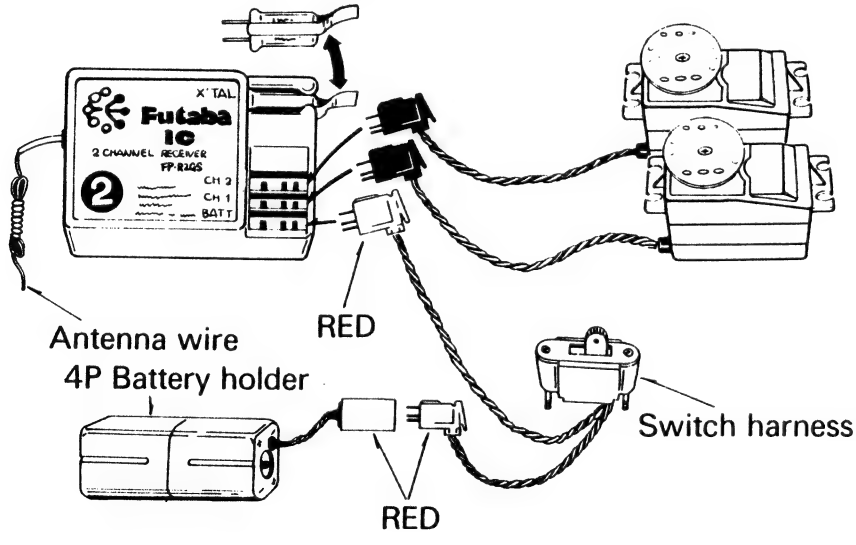


Fig.4

X'tal..... Crystal
CH2..... Elevator or (Throttle)
CH1..... Aileron or (Rudder)
BATT..... Power supply

2. Since all the servos are manufactured to the same standards, any servo can be used for any purpose.

3. After verifying that all connections are correct by checking them against the connections given in Figure 3, turn the transmitter power switch on. Then turn the receiver switch on. At this time, each servo will stop at the neutral position.

4. Operate sticks and trim levers and verify that respective servos operate positively.

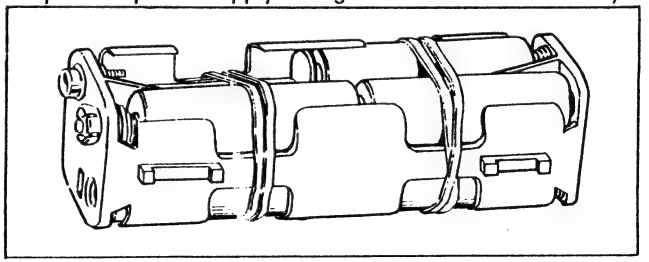
5. When testing each section, be sure that the transmitter and receiver antennas are fully extended. If the transmitter antenna is short and the power switch is left on for more than 5 minutes, the transistors inside the transmitter will be damaged.

POWER SUPPLY, BATTERIES, AND VOLTAGE CHECK

FP-2E, FP-2F (2-CHANNEL)

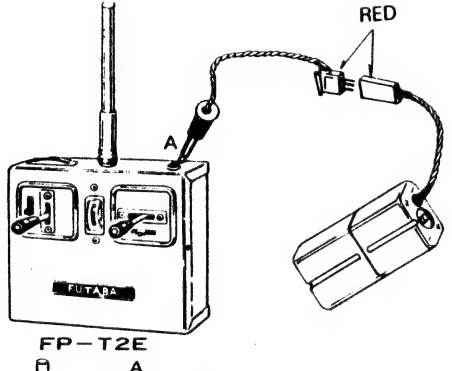
The FP-2E and FP-2F have a 7P battery holder inside the transmitter and an external receiver servo power supply use 4P battery holder. (*There is a 8P battery holder inside the transmitter; FP-T2E, 72MHz band only).

1. Use penlight batteries at each battery holder. Select long-life batteries as far as possible.
2. Be sure that the (+) (−) polarities are correct when loading the batteries into the battery holder.
3. After loading the 7 batteries into the holder, wrap rubber bands around the holder as illustrated in the figure to prevent faulty contact.
4. After loading the 4 batteries into the 4P battery holder, tighten the nuts screw securely.
5. When the transmitter switch is set to the ON position, the pointer of the meter will deflect to the green zone. If the batteries are new, the meter indication will drop after the transmitter has been used for a certain period of time. When the meter indication drops below the green zone, change the batteries. The transmitting range will be shortened considerably when the meter indication drops below the green zone.
6. Load the new batteries into the 4P battery holder, connect the voltage check lead, and insert into the jack of the transmitter. (Transmitter switch OFF. The meter pointer will deflect past the green zone.
   When the batteries are new, the meter indication will drop below the green zone after being used for a certain period of time. Replace the batteries at this time. A drop in the power supply voltage will cause the sensitivity of the receiver to drop, leading to erroneous operation of the servos.
7. Since the voltage of the dry cell batteries will drop during use, always perform the voltage check. Normally, perform the voltage check after being used 5~6 times at 10 minutes per time when the batteries are new.



PERFORMANCE TEST AND MOUNTING PRECAUTIONS

1. Check the voltage of each battery and verify that the receiver and servos are connected in accordance with Figure 3. Then, make the transmitter antenna as short as possible (In the case of the FP-T2F, extend one section of the antenna) and extend the receiver antenna and attempt operation from a distance of 20m～30m. Operation is normal if all the controls are functioning properly. Perform this test within a maximum of 5 minutes time. Never perform this test when the transmitter antenna is not mounted to the transmitter. Otherwise the transmitter will be adversely effected.



• Receiver voltage check
(1) Insert the check lead at A.
(2) Set the Tx switch to OFF.
(3) The meter pointer must deflect to 10 or higher.

Fig.5

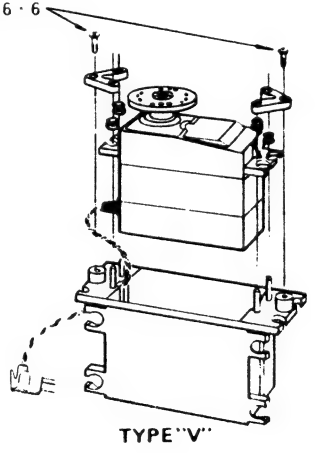


Fig.6

3. The use of a servo tray is extremely convenient when installing the servos. The method of installation is illustrated in the figure 6. (Insert each connector fully.) Don't forget to confirm that the motion of the servo horns and rods matches the direction of operation of the transmitter sticks. Use the reversible servo FP-S28L as a shoulder wing throttle servo or for rudder and nose gear operation.

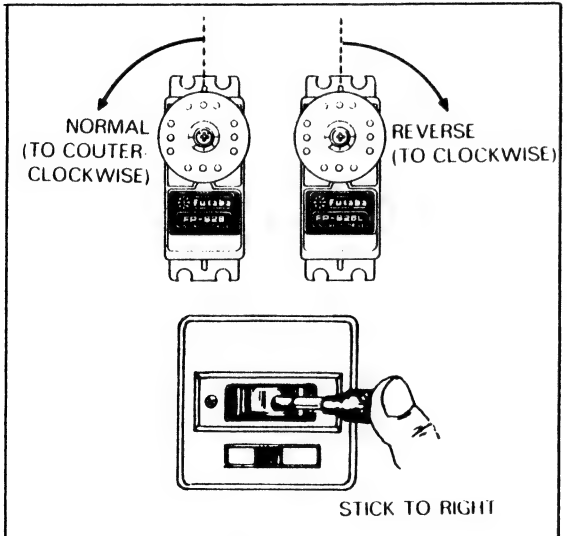


Fig. 7

- NOTE: The FP-S28L cannot be used for aileron control. (The operation of the stick and rudder are opposite.)

4. After setting the push rod at each servo, operate each servo fully left and right at least once. If the rod catches or sticks at this time, the servo has been damaged by an overcurrent. Therefore verify that the rods are functioning perfectly.
5. Be especially careful of noise signals. For instance, noise signals will be generated by the contact of metal against metal due to engine vibration. If these noise signals are received at the receiver, the receiver may operate erroneously. Therefore cover one of the metal surfaces with insulating material.

6. After installation is complete, ask a nearby radio control expert or the dealer where the equipment was purchased to instruct you on the proper handling techniques and other items which may require special attention. Also have your installation thoroughly checked at this time.
   Strict observance of safety rules and adherence to the advise of experts will make radio control more enjoyable.

Futaba Digital Proportional Frequencies (FOR U.S.A.)

Frequency	Channel No.	Flag Color
26-27MHz - Aircraft/Car/Boat		
26.995	--	Brown
27.045	–	Red
27.095	–	Orange
27.145	–	Yellow
27.195	–	Green
27.255	–	Blue
72/75MHz - Aircraft only *Shared		
72.030	12	Brown-Red (Top Flag/Ribbon-Bottom Flag/Ribbon)
72.080	–	White/Brown
72.160*	–	White/Blue
72.240	–	White/Red
72.320*	–	White/Purple
72.400	–	White/Orange
72.550	38	Orange-Grey
72.590	40	Yellow-Black
72.630	42	Yellow-Red
72.670	44	Yellow-Yellow
72.710	46	Yellow-Blue
72.750	48	Yellow-Grey
72.790	50	Green-Black
72.830	52	Green-Red
72.870	54	Green-Yellow
72.910	56	Green-Blue
72.960*	–	White/yellow
75.640	–	White/Green
75MHz - Car & Boat only		
75.430	62	Blue-Red (Top Flag/Ribbon-Bottom Flag/Ribbon)
75.470	64	Blue-Yellow
75.510	66	Blue-Blue
75.550	68	Blue-Grey
75.590	70	Purple-Black
75.670	74	Purple-Yellow
75.710	76	Purple-Blue
75.750	78	Purple-Grey
75.790	80	Grey-Black
75.830	82	Grey-Red
75.870	84	Grey-Yellow
53MHz - Aircraft/Car/Boat - FCC Amatuer License Required		
53.100	–	Black/Brown
53.200	–	Black/Red
53.300	–	Black/Orange
53.400	–	Black/Yellow
53.500	–	Black/Green
53.600	–	Black/Blue (Not generally in use)
53.700	–	Black/Purple (Not generally in use)
53.800	–	Black/Grey (Not generally in use)

- The frequency of Futaba digital proportional sets can be changed among bands (1)~(6) on the 27MHz band only.
- However, a 27MHz band set cannot be changed to 72MHz band, and vice versa.
- Therefore, always attach the correct frequency flag to the end of the transmitter antenna. Each frequency band has its own designated color, as stated above. The frequency flag is intended for identification purposes.
- Also change the frequency flag when frequency is changed.
- Futaba paired crystals are precisely matched. Always use a Futaba crystal set (transmitter, receiver) when changing the frequency.
- It is illegal to change crystals of transmitter on the 72-75MHz bands in the U.S.A.

FOR OTHER MARKETS, FOLLOWING FREQUENCIES ARE AVAILABLE.

	FP-2E FP-2F	
	AM	FM
27MHz Band	O	X
29MHz Band	X	X
35MHz Band	X	X
40MHz Band	X	X
53/60MHz Band	X	X
72/75MHz Band	O	X

The authorized frequencies on each countries are as follows:

England . . . . . .27 & 35MHz AM and FM
Sweden . . . . . .27 & 35MHz AM and FM
Scandinavian countries . . . . . .27, 35, and 40MHz AM/FM
Australia 29MHz

FACTORY REPAIR SERVICE

To insure prompt service, please follow the instructions given below.

1. Charge the batteries for at least 18 hours prior to shipment.
2. Return the system only. Not your complete installation. Remove the servos from their mounts and remove the foam padding from the receiver.
3. Plugs or other modifications which interfere with factory test procedures will be returned to factory standard at your expense.
4. Carefully pack all components individually, using sufficient packing material to prevent damage during shipment.
5. Include a brief but thorough explanation of all problems and service required and tape it to the back of the transmitter. Place a label describing the functions of the servo on each servo.
6. Be sure to include your full address and zip code inside the box as well as on the outside.
7. Include a packing list of all items being returned, and double check to make sure that all items are packed.
8. Upon receipt of damaged equipment at the FUTABA factory, an estimate of the cost of repair will be sent to you. Your equipment will then be repaired and returned to you upon receipt of payment.

This factory repair service applies only to the continental U.S.A., Hawaii, and Alaska.

GUARANTEE

Your NEW FUTABA Digital Proportional R/C system is guaranteed against defects in workmanship and material for 180 days from the date of purchase when the attached registration card is returned to us within ten days of purchase.

This Guarantee is null and void if the R/C system has been improperly handled, damaged in a crash, or tampered with and does not cover the replacement of plastic housings or electronic components damaged due to the use of improper voltages.

When service is required, please take your equipment to your local authorized service station or ship it directly to us. All postage, shipping, and insurance charges must be paid by the user.

This guarantee only applies to the continental U.S.A., Hawaii, and Alaska.

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